Dairy Australia

Bioenergy

Currently, bioenergy is likely to only be competitive at a large scale. Smaller modular systems are yet to be proven as economical.

Should I consider producing bioenergy at my farm?

Quick answer: Not unless you are a very large farm, or you are paying to dispose of animal or crop waste. You may also consider it if you want to enter an Emissions Reduction Fund (ERF) project using a cooperative model with other farmers and share the benefits of cheaper electricity or from Australian Carbon Credit Units (ACCUs) sales revenue.

What is bioenergy?

Bioenergy refers to the utilisation of biomass (crop waste, wood waste, manure, food waste and other organics) to create heat or electricity or both (combined heat-and-power) or a transport fuel (bioethanol or biodiesel). It can benefit the environment by reducing methane emissions from decomposing waste materials and by displacing the use of fossil fuels.

Anaerobic digestion is one of the more common methods for creating bioenergy whereby methane is emitted in the form of biogas – a mixture of carbon dioxide and methane.

Many anerobic digestion bioenergy facilities have been installed in the Australian pig industry that capture the methane emissions from manure at intensive feedlots. This is done using a covered anaerobic lagoon (CAL) or completely stirred tank digester (CSTD), and utilises that methane for production of electricity and heat in a cogeneration gas engine.

These facilities create ACCUs for their reduction in methane emissions as well as Small-scale Technology Certificates (STCs) for the generation of electricity.

For dairy systems, particularly fully grazed systems, there is usually not a sufficient volume of manure able to be collected to make an AD project viable. Working with other farms to consolidate/aggregate your wastes to achieve the required scale for a viable AD system is one option, and such a project may be eligible under the ERF to earn ACCUs.

However, these projects are complex as well as expensive and should be approached with caution. See **Dairy Australia's Carbon Markets web pages** for information on what to consider when looking at projects under the ERF.

There are various ways to utilise agricultural and food waste as summarised in Figure 1. Bioethanol and biodiesel are also forms of bioenergy, but these are largely not viable technologies for dairy farms.

Why hasn't the dairy industry done more bioenergy projects?

Firstly, the pig industry has intensive farming that captures manure before it emits the methane through natural processes.

Typically, a dairy farm is not able to capture the manure before it has degraded, and the methane potential has decreased. Secondly, the amount of manure produced in a piggery is much larger compared to a typical dairy farm.

What is the best way to utilise waste biomass?

In terms of climate and energy benefits, anerobic digestion of organic waste provides the most reduction in equivalent carbon emissions and produces the most net energy.

Technologies such as gasification, pyrolysis or incineration may be possible in the future, but currently have very high capital costs and only projects with government funding have proceeded.

What is the future of bioenergy for the dairy industry?

Economical creation of bioenergy typically requires a large-scale operation and/or a farming system where cows are contained for large periods of time. New projects are being developed that have this scale to economically create bioenergy.

Moxey Farm in New South Wales is Australia's largest single-site dairy with 6,000 head of cattle. It is investing in an anerobic digestion process that will capture manure and convert it into biogas.

Each cow produces around 30 kilograms of waste per day, which equates to around 5,700 tonnes of manure per year. The facility will cost around $20 million and produce three megawatts of renewable energy.

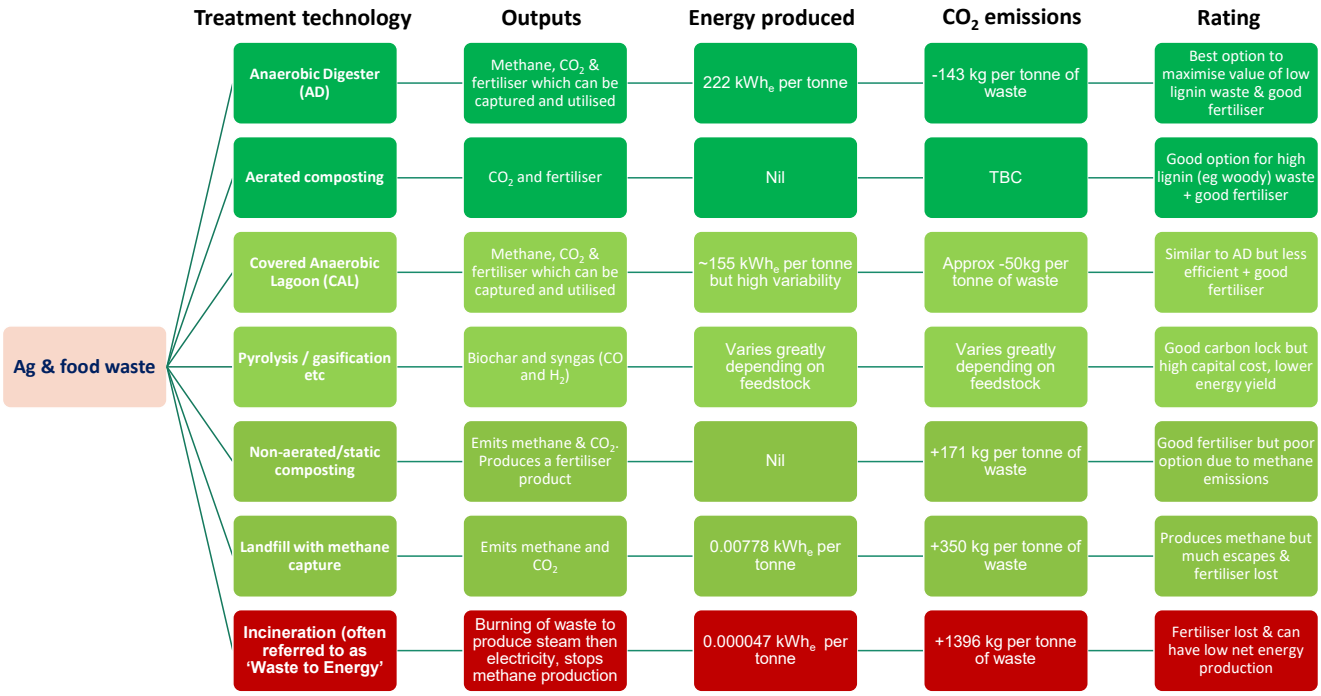
In cases where such economies of scale cannot be achieved, smaller modular anerobic digestion facilities may be possible. The performance and economics of such facilities are yet to be verified via published research.

For now, best practice in effluent management will reduce emissions from dairy waste for most farms.

Figure 1 Various treatment technologies for utilising agricultural and food waste for bioenergy

Source: Australian Alliance for Energy Productivity

Figure 2 Various ways to utilise agricultural and food waste for bioenergy



Source: Australian Alliance for Energy Productivity

Sources:

farmonline.com.au/story/6228869/moxey-biodigester-to-power-whole-farm/

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